APPENDIX 7-B
U.S. PATENT 6,104,992 IS INVALID UNDER 35 U.S.C. 102
IN LIGHT OF U.S. PATENT 5,893,060 ("the '060 patent")

Claims	Invalidity Based on US 5,893,060
1[a]. A speech system using an analysis by synthesis approach on a speech signal, the speech system comprising:	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses: A method and device eradicate the occasional instability inherent in analysis-by-synthesis speech/audio codecs and caused in particular by channel errors during transmission of highly periodic signals such as high-frequency sine waves. Analysis-by-synthesis techniques involve production, in response to the speech/audio signal and at regular time intervals called frames, of (a) a set of spectral parameters for use in driving a synthesis filter in view of synthesizing the speech/audio signal, and (b) a pitch gain for constructing a past-excitation-signal component supplied to the synthesis filter. In accordance with the instability eradication method, the first step consists of detecting a set of conditions including (i) a resonance condition assessed from the spectral parameters, (ii) a duration condition detected when the resonance condition has prevailed for at least the M most recent frames, M being an integer greater than 1, and (iii) a gain condition which evidences consistently-high values of the pitch gain in the N most recent frames, N being an integer greater than 1. To eradicate the occasional instability, the pitch gain is reduced to a value lower than a given threshold whenever these three conditions are detected. **'060 Patent, Abstract**. The present invention is concerned with the field of digital encoding of speech, audio and other signals based on analysis-by-synthesis techniques including, in particular but not exclusively, Multipulses, Code Excited Linear Prediction (CELP) and Algebraic-Code Excited Linear Prediction (ACELP). More specifically, the present invention relates to the eradication of an occasional instability found in these analysis-by-synthesis techniques. **'060 Patent, 1:8-16.**
[1b] an adaptive codebook;	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses:

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	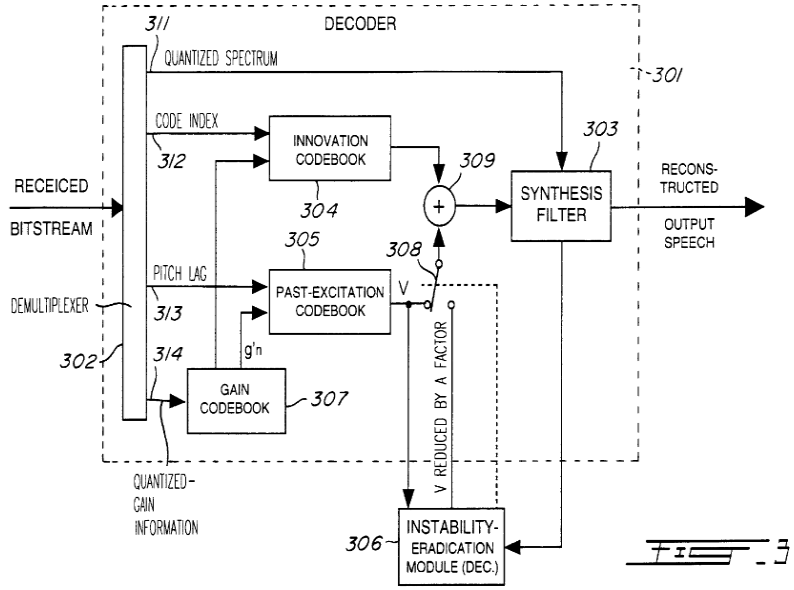 **'060 Patent, Fig. 3.** The decoder 301 of FIG. 3 comprises a demultiplexer 302 for demultiplexing the bitstream received from the encoder 101 of FIG. 1 into a quantized spectrum 311 (corresponding to transmitted spectrum 111), a code index 312 (corresponding to transmitted code index 112), a pitch lag 313 (corresponding to transmitted pitch lag 113) and to quantized-gain information 314 (corresponding to transmitted quantized gains 114). The reconstructed speech is outputted from a synthesis filter 303. This synthesis filter 303 is excited by the sum of two components, namely (a) a codevector from an innovation codebook 304 in response to the code index information 312 and the code gain extracted from the quantized gain information 314 by a gain codebook 307, and (b) a past-excitation component v from a past-excitation-codebook 305 in response to the received pitch-lag information 313 and the pitch gain retrieved by the gain codebook 307 from the quantized-gain information 314. The spectrum 311 is also used to drive the synthesis filter 303. More specifically, a periodic excitation signal is applied to the synthesis filter 303 to produce the desired output speech, this periodic excitation signal being constructed by adding the received innovation signal to a past-excitation-signal

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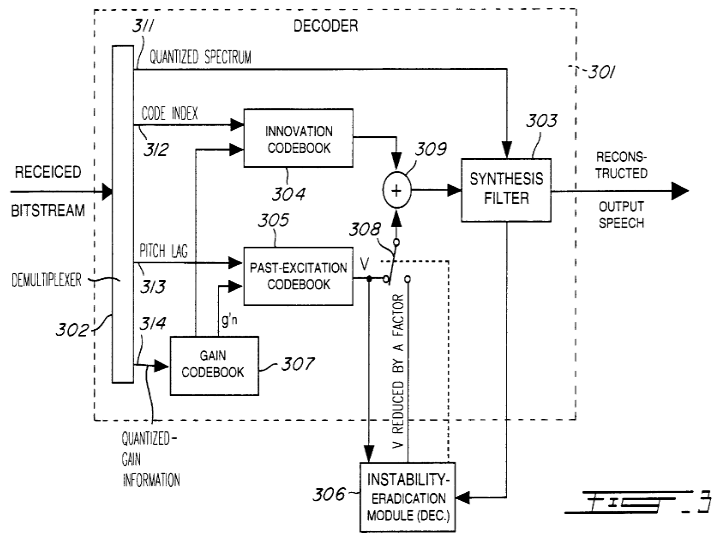
Claims	Invalidity Based on US 5,893,060
	component, more precisely to the excitation signal a pitch-lag ago multiplied by the pitch gain. Whenever the frame duration is longer than the pitch lag, the frame is filled by repeating the past excitation according to the well known adaptive codebook technique. **'060 Patent, 6:58-7:17.**
[1c] a fixed codebook;	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses:  **'060 Patent, Fig. 3.** The decoder 301 of FIG. 3 comprises a demultiplexer 302 for demultiplexing the bitstream received from the encoder 101 of FIG. 1 into a quantized spectrum 311 (corresponding to transmitted spectrum 111), a code index 312 (corresponding to transmitted code index 112), a pitch lag 313 (corresponding to transmitted pitch lag 113) and to quantized-gain information 314 (corresponding to transmitted quantized gains 114). The reconstructed speech is outputted from a synthesis filter 303. This synthesis filter 303 is excited by the sum of

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	two components, namely (a) a codevector from an innovation codebook 304 in response to the code index information 312 and the code gain extracted from the quantized gain information 314 by a gain codebook 307, and (b) a past-excitation component v from a past-excitation-codebook 305 in response to the received pitch-lag information 313 and the pitch gain retrieved by the gain codebook 307 from the quantized-gain information 314. The spectrum 311 is also used to drive the synthesis filter 303. More specifically, a periodic excitation signal is applied to the synthesis filter 303 to produce the desired output speech, this periodic excitation signal being constructed by adding the received innovation signal to a past-excitation-signal component, more precisely to the excitation signal a pitch-lag ago multiplied by the pitch gain. Whenever the frame duration is longer than the pitch lag, the frame is filled by repeating the past excitation according to the well known adaptive codebook technique. **'060 Patent, 6:58-7:17.**
[1d] a processing circuit that sequentially identifies a first gain applied to the adaptive codebook and a second gain applied to the fixed codebook; and	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses: Analysis-by-synthesis speech encoding techniques are based on a speech production model involving as shown in FIG. 1 the production of: (a) a quantized spectrum 111 described by a set of P spectral coefficients, where P is the order; (b) a description of an innovation signal typically by way of a code index 112 and a code gain (included in the quantized-gain information 114); (c) a pitch lag 113; and (d) a pitch gain (included in the quantized gains 114). **'060 Patent, 6:43-53.**

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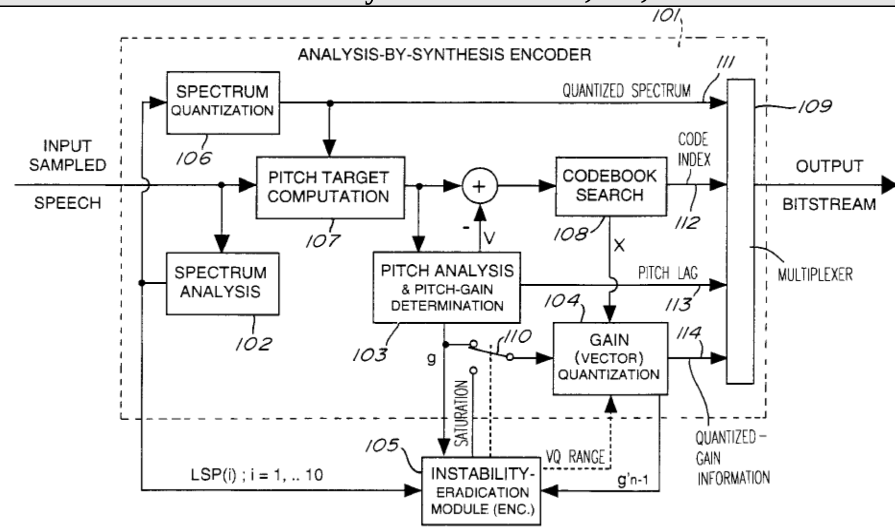
Claims	Invalidity Based on US 5,893,060
	 **'060 Patent, Fig. 1.**

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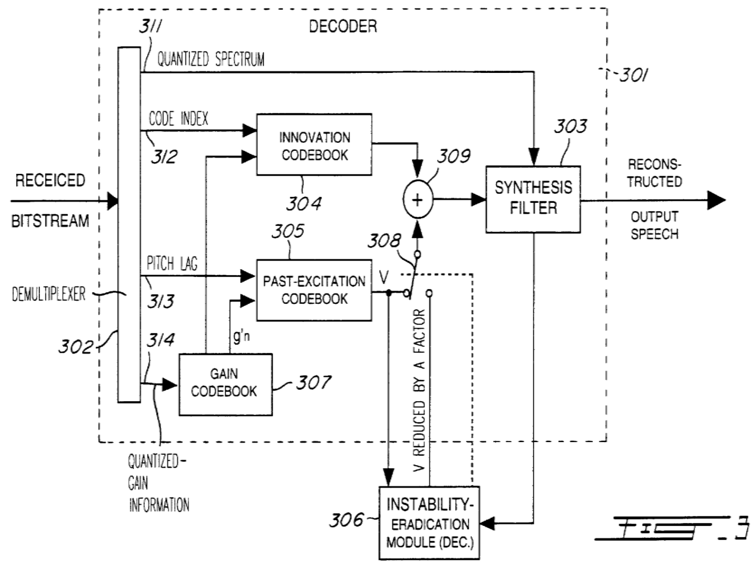
Claims	Invalidity Based on US 5,893,060
	 **'060 Patent, Fig. 3.**
[1e] the processing circuit identifies a gain reduction factor applied to the first gain identified, the gain reduction factor is used by the processing circuit to perform the identification of the second gain.	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, the '060 patent discloses a processing circuit (*e.g.*, Speech Encoder/Decoder of Figures 1-3) that "identifies" a gain threshold value G_T which, under certain conditions, is "applied" to the adaptive (past-excitation) codebook gain g. The '060 patent further discloses that, in some embodiments, the adaptive codebook gain g and the fixed (innovation) codebook gain x are jointly quantized using a vector quantization technique. *See e.g.*, Step 211 of Fig. 2. In such situations, the vector quantized value of the fixed codebook gain x will be based in part on the value of the adaptive codebook gain g. Thus, in situations where the adaptive codebook gain g is limited by the gain threshold value G_T, it follows that the Speech Encoder/Decoder uses the gain threshold value G_T to "identify" the quantized value the fixed codebook gain x, which is used to generate the contribution from the fixed (innovation) codebook as shown in Figure 3. For example, without limitation, the '060 patent discloses: According to the invention, the instability eradication method comprises a detection step for detecting a set of

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Claims	Invalidity Based on US 5,893,060
	conditions related to the spectral parameters and the pitch gain, and a modification step for reducing the pitch gain to a value lower than a given threshold whenever the conditions of the above mentioned set are detected in order to eradicate the occasional instability. **'060 Patent, 2:18-24.** The modification step may comprise the step of reducing a quantized version of the pitch gain to a value lower than a given threshold G_T whenever the conditions of the above mentioned set are detected in order to eradicate the occasional instability. **'060 Patent, 2:44-48.** Switch 110 is normally in the position as shown in FIG. 1. In this case, the instability-eradication module 105 does not interfere with normal operation of the encoder 101; indeed the pitch gain g outputted from module 103 is passed untouched to the quantization module 104. If however, the instability-eradication module 105 identifies a problem potential, it will change the position of switch 110 thereby saturating the current pitch gain g to some value (e.g.: G_T) and will cause the quantized pitch gain included in the output of gain vector-quantization module 104 to be limited to a value lower than a given threshold (e.g.: G_T). **'060 Patent, 7:50-60.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. A frame with problem potential is identified whenever the three following conditions are detected: 1) A resonance condition prevails in the input signal to be encoded. In other words a highly correlated stationary signal is present. A typical signal having these characteristics is a sinusoidal tone or a combination of tones. The present specification discloses an efficient approach to assessing resonance conditions by monitoring the occurrence of resonance in the LSP-spectrum already available in the encoder.

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	2) A duration condition is detected when the resonance condition has prevailed for at least the M most recent frames where M is an integer greater than 1; a typical value for M is 12. 3) A gain condition which evidences consistently-high values of the pitch gain in the N most recent frames, N being an integer greater than 1. For example, a consistently-high pitch-gain condition is detected when the average pitch gain computed over the most recent N+1 pitch-gain values exceeds a given threshold; a typical value for N is 7. **'060 Patent, 8:30-60.** Gain condition Step 209 detects a problem potential by detecting the consistently-high pitch-gain condition when the average G of the pitch gain over the N most recent frames, computed in step 208, is higher than a fixed threshold G_T, where 0.95 is a typical value for G_T according to the implementation illustrated in step 208. **'060 Patent, 9:49-55.** If a problem potential is detected Step 210 saturates the pitch gain g to G_T or another threshold (a simpler variant for step 210 consists of setting g = G_T because g is expected to be large on entering this step). The quantization operation of step 211 takes place in vector-quantization module 104 under instructions from the instability-eradication module 105 to limit the search range to codevectors corresponding to quantized pitch gains lower than G_T or similar value. **'060 Patent, 9:62-10:3.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity.

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Claims	Invalidity Based on US 5,893,060
	'060 Patent, 8:30-39. In essence, steps 201 through 204 determine whether or not a resonance condition prevails in the input speech signal to be encoded. If a resonance condition is detected, steps 206 and 207 determine whether the duration, during which the resonance condition has been prevailing, exceeds a given number of frames (duration condition). If this duration condition is detected, a problem potential is recognized if the (weighted) average pitch gain is above a given threshold and the current pitch gain is above a certain threshold G_T. When a problem potential is recognized, the quantized pitch gain g'_n is caused to stay below a certain threshold (e.g.: G_T) in step 211 by limiting the search range of the vector quantization module 104 (FIG. 1). **'060 Patent, 9:1-14.**

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	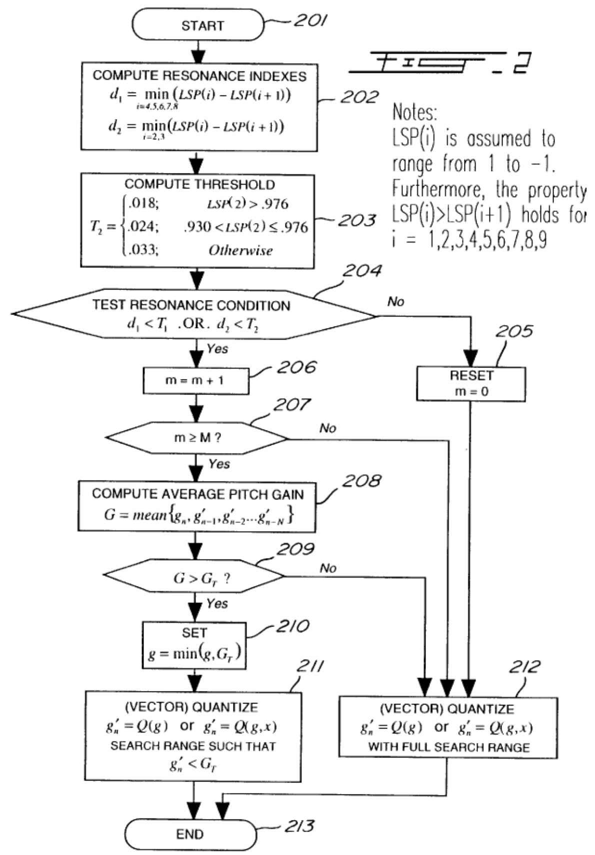 '060 Patent, Fig. 2.

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	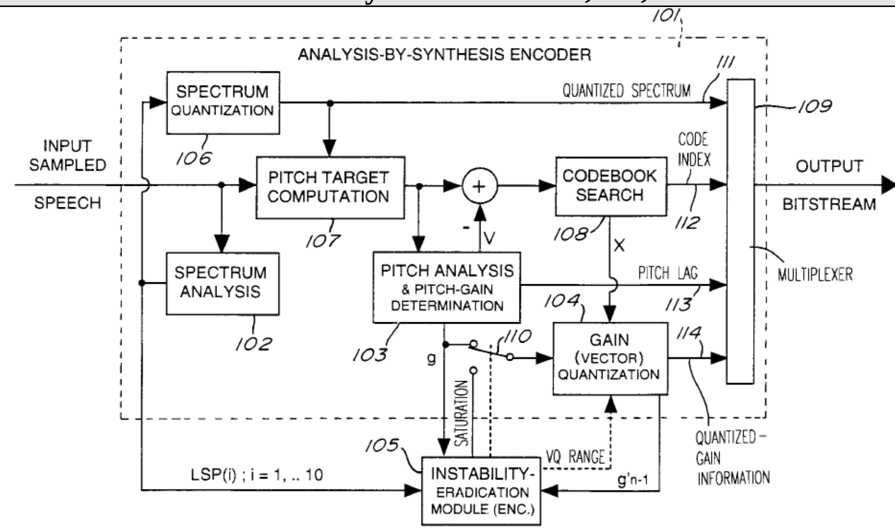 **'060 Patent, Fig. 1.**

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	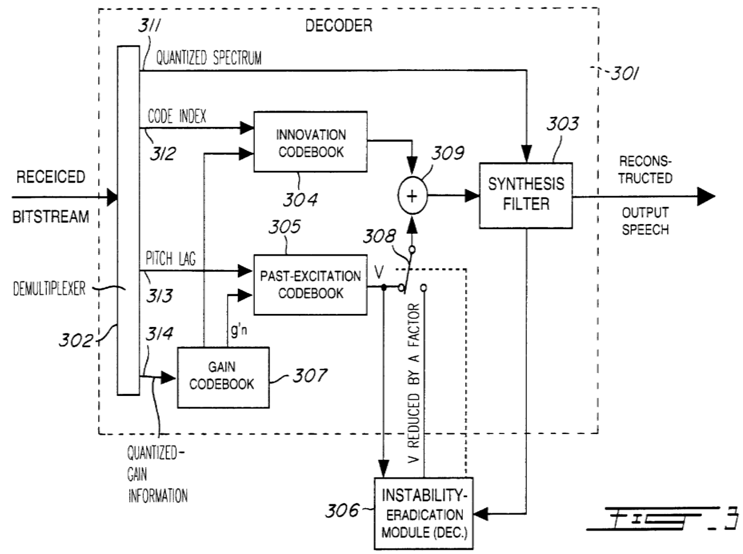 **'060 Patent, Fig. 3.**
2. The speech system of claim 1 wherein the gain reduction factor comprises an adaptive gain factor.	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses: According to the invention, the instability eradication method comprises a detection step for detecting a set of conditions related to the spectral parameters and the pitch gain, and a modification step for reducing the pitch gain to a value lower than a given threshold whenever the conditions of the above mentioned set are detected in order to eradicate the occasional instability. **'060 Patent, 2:18-24.** The modification step may comprise the step of reducing a quantized version of the pitch gain to a value lower than a given threshold G.sub.T whenever the conditions of the above mentioned set are detected in order to

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	eradicate the occasional instability. **'060 Patent, 2:44-48.** Switch 110 is normally in the position as shown in FIG. 1. In this case, the instability-eradication module 105 does not interfere with normal operation of the encoder 101; indeed the pitch gain g outputted from module 103 is passed untouched to the quantization module 104. If however, the instability-eradication module 105 identifies a problem potential, it will change the position of switch 110 thereby saturating the current pitch gain g to some value (e.g.: G_T) and will cause the quantized pitch gain included in the output of gain vector-quantization module 104 to be limited to a value lower than a given threshold (e.g.: G_T). **'060 Patent, 7:50-60.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. A frame with problem potential is identified whenever the three following conditions are detected: 1) A resonance condition prevails in the input signal to be encoded. In other words a highly correlated stationary signal is present. A typical signal having these characteristics is a sinusoidal tone or a combination of tones. The present specification discloses an efficient approach to assessing resonance conditions by monitoring the occurrence of resonance in the LSP-spectrum already available in the encoder. 2) A duration condition is detected when the resonance condition has prevailed for at least the M most recent frames where M is an integer greater than 1; a typical value for M is 12. 3) A gain condition which evidences consistently-high values of the pitch gain in the N most recent frames, N being an integer greater than 1. For example, a consistently-high pitch-gain condition is detected when the average pitch gain computed over the most recent N+1 pitch-gain values exceeds a given threshold; a typical value for N is 7.

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	'060 Patent, 8:30-60. Gain condition Step 209 detects a problem potential by detecting the consistently-high pitch-gain condition when the average G of the pitch gain over the N most recent frames, computed in step 208, is higher than a fixed threshold G_T, where 0.95 is a typical value for G_T according to the implementation illustrated in step 208. **'060 Patent, 9:49-55.** If a problem potential is detected Step 210 saturates the pitch gain g to G_T or another threshold (a simpler variant for step 210 consists of setting g = G_T because g is expected to be large on entering this step). The quantization operation of step 211 takes place in vector-quantization module 104 under instructions from the instability-eradication module 105 to limit the search range to codevectors corresponding to quantized pitch gains lower than G_T or similar value. **'060 Patent, 9:62-10:3.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. **'060 Patent, 8:30-39.** In essence, steps 201 through 204 determine whether or not a resonance condition prevails in the input speech signal to be encoded. If a resonance condition is detected, steps 206 and 207 determine whether the duration, during which the resonance condition has been prevailing, exceeds a given number of frames (duration condition). If this duration condition is detected, a problem potential is recognized if the (weighted) average pitch gain is above a given threshold and the current pitch gain is above a certain threshold G_T. When a problem potential is recognized, the quantized pitch gain g'_n is caused to stay below a certain threshold (e.g.: G_T) in step 211 by limiting the search range of the vector quantization module 104 (FIG. 1).

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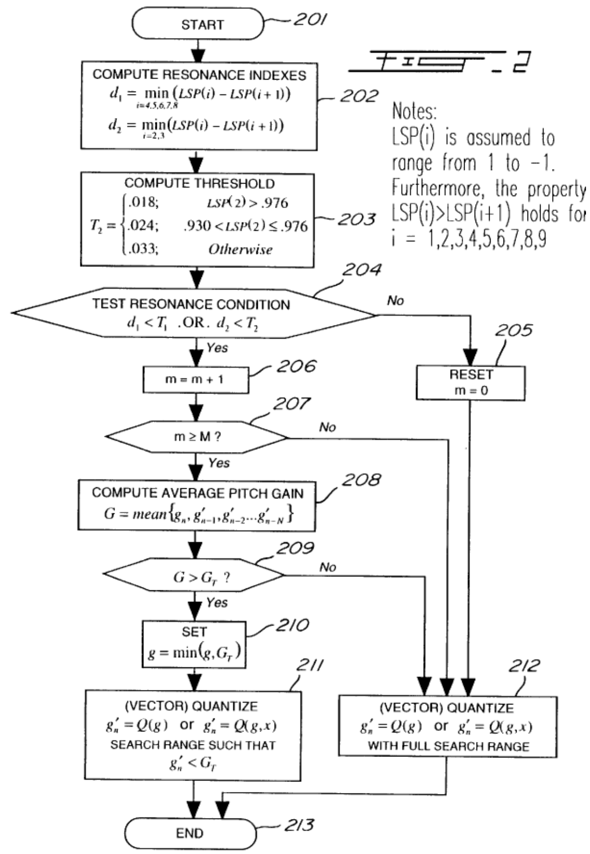
Claims	Invalidity Based on US 5,893,060
	'060 Patent, 9:1-14.  **'060 Patent, Fig. 2.**

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	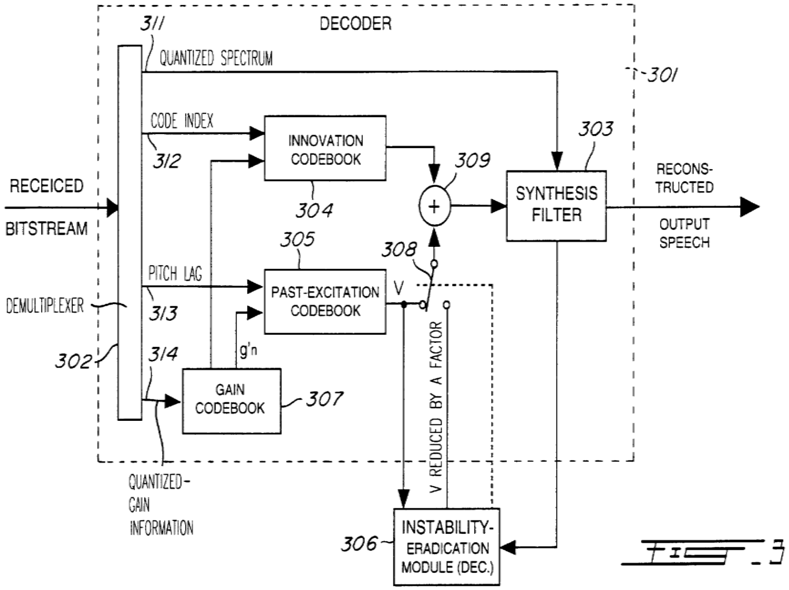 **'060 Patent, Fig. 3.**
3. The speech system of claim 2 wherein the processing circuit identifies the adaptive gain factor by considering, at least in part, an encoding bit rate.	
7[a] A speech system using an analysis by synthesis approach on a speech signal, the speech system comprising:	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses: A method and device eradicate the occasional instability inherent in analysis-by-synthesis speech/audio codecs and caused in particular by channel errors during transmission of highly periodic signals such as high-frequency sine waves. Analysis-by-synthesis techniques involve production, in response to the

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	speech/audio signal and at regular time intervals called frames, of (a) a set of spectral parameters for use in driving a synthesis filter in view of synthesizing the speech/audio signal, and (b) a pitch gain for constructing a past-excitation-signal component supplied to the synthesis filter. In accordance with the instability eradication method, the first step consists of detecting a set of conditions including (i) a resonance condition assessed from the spectral parameters, (ii) a duration condition detected when the resonance condition has prevailed for at least the M most recent frames, M being an integer greater than 1, and (iii) a gain condition which evidences consistently-high values of the pitch gain in the N most recent frames, N being an integer greater than 1. To eradicate the occasional instability, the pitch gain is reduced to a value lower than a given threshold whenever these three conditions are detected. **'060 Patent, Abstract**. The present invention is concerned with the field of digital encoding of speech, audio and other signals based on analysis-by-synthesis techniques including, in particular but not exclusively, Multipulses, Code Excited Linear Prediction (CELP) and Algebraic-Code Excited Linear Prediction (ACELP). More specifically, the present invention relates to the eradication of an occasional instability found in these analysis-by-synthesis techniques. **'060 Patent, 1:8-16.**
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	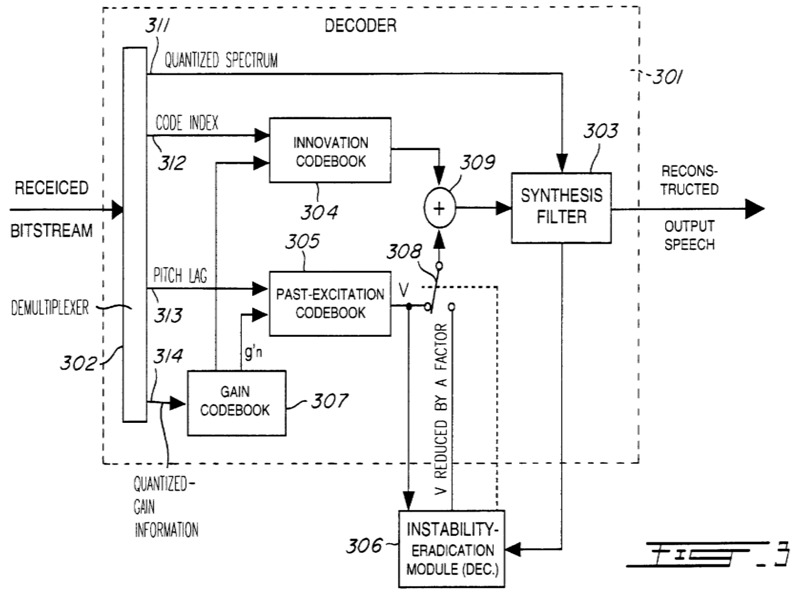 **'060 Patent, Fig. 3.** The decoder 301 of FIG. 3 comprises a demultiplexer 302 for demultiplexing the bitstream received from the encoder 101 of FIG. 1 into a quantized spectrum 311 (corresponding to transmitted spectrum 111), a code index 312 (corresponding to transmitted code index 112), a pitch lag 313 (corresponding to transmitted pitch lag 113) and to quantized-gain information 314 (corresponding to transmitted quantized gains 114). The reconstructed speech is outputted from a synthesis filter 303. This synthesis filter 303 is excited by the sum of two components, namely (a) a codevector from an innovation codebook 304 in response to the code index information 312 and the code gain extracted from the quantized gain information 314 by a gain codebook 307, and (b) a past-excitation component v from a past-excitation-codebook 305 in response to the received pitch-lag information 313 and the pitch gain retrieved by the gain codebook 307 from the quantized-gain information 314. The spectrum 311 is also used to drive the synthesis filter 303. More specifically, a periodic excitation signal is applied to the synthesis filter 303 to produce the desired output speech, this periodic excitation signal being constructed by adding the received innovation signal to a past-excitation-signal

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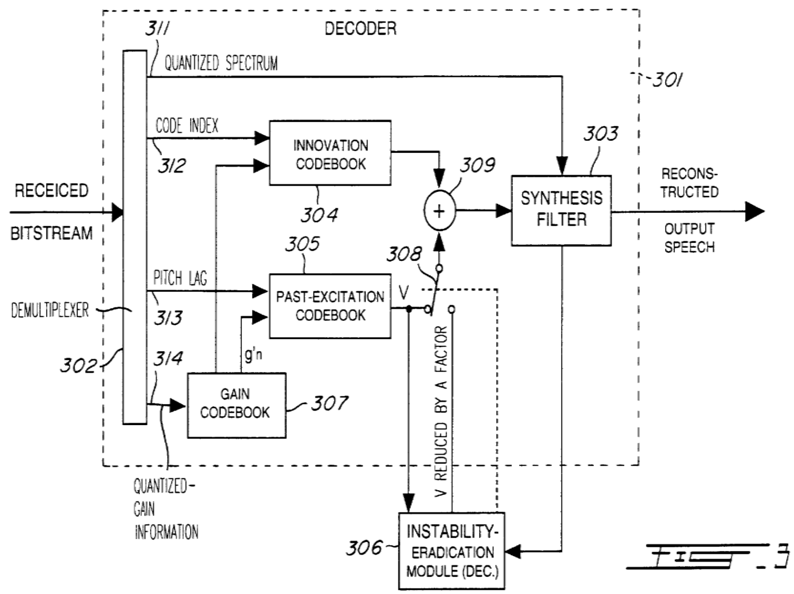
<table>
<tr><th>Claims</th><th>Invalidity Based on US 5,893,060</th></tr>
<tr><td></td><td>component, more precisely to the excitation signal a pitch-lag ago multiplied by the pitch gain. Whenever the frame duration is longer than the pitch lag, the frame is filled by repeating the past excitation according to the well known adaptive codebook technique.

'060 Patent, 6:58-7:17.</td></tr>
<tr><td>[7c] a fixed codebook;</td><td>To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses:



'060 Patent, Fig. 3.

The decoder 301 of FIG. 3 comprises a demultiplexer 302 for demultiplexing the bitstream received from the encoder 101 of FIG. 1 into a quantized spectrum 311 (corresponding to transmitted spectrum 111), a code</td></tr>
</table>

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	index 312 (corresponding to transmitted code index 112), a pitch lag 313 (corresponding to transmitted pitch lag 113) and to quantized-gain information 314 (corresponding to transmitted quantized gains 114). The reconstructed speech is outputted from a synthesis filter 303. This synthesis filter 303 is excited by the sum of two components, namely (a) a codevector from an innovation codebook 304 in response to the code index information 312 and the code gain extracted from the quantized gain information 314 by a gain codebook 307, and (b) a past-excitation component v from a past-excitation-codebook 305 in response to the received pitch-lag information 313 and the pitch gain retrieved by the gain codebook 307 from the quantized-gain information 314. The spectrum 311 is also used to drive the synthesis filter 303. More specifically, a periodic excitation signal is applied to the synthesis filter 303 to produce the desired output speech, this periodic excitation signal being constructed by adding the received innovation signal to a past-excitation-signal component, more precisely to the excitation signal a pitch-lag ago multiplied by the pitch gain. Whenever the frame duration is longer than the pitch lag, the frame is filled by repeating the past excitation according to the well known adaptive codebook technique. **'060 Patent, 6:58-7:17.**
[7d] a processing circuit that generates a first contribution from the adaptive codebook and a second contribution from the fixed codebook; and	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses a processing circuit (e.g., Speech Encoder/Decoder of Figs. 1-3) that generates a first contribution from the adaptive (past-excitation) codebook and a second contribution from the fixed (innovation) codebook. For example, the '060 patent discloses: Analysis-by-synthesis speech encoding techniques are based on a speech production model involving as shown in FIG. 1 the production of: (a) a quantized spectrum 111 described by a set of P spectral coefficients, where P is the order; (b) a description of an innovation signal typically by way of a code index 112 and a code gain (included in the quantized-gain information 114); (c) a pitch lag 113; and (d) a pitch gain (included in the quantized gains 114).

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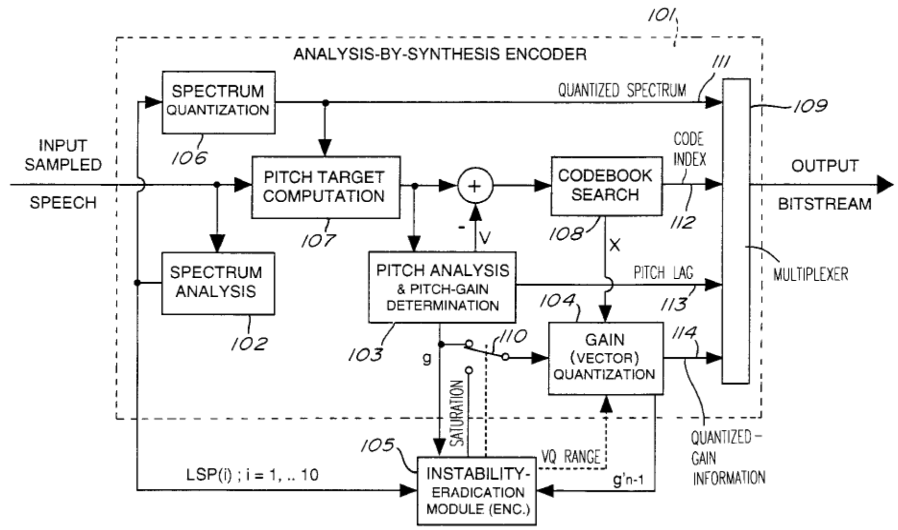
IN LIGHT OF U.S. PATENT 5,893,060 ("the '060 patent")

Claims	Invalidity Based on US 5,893,060
	'060 Patent, 6:43-53.  **'060 Patent, Fig. 1.** The decoder 301 of FIG. 3 comprises a demultiplexer 302 for demultiplexing the bitstream received from the encoder 101 of FIG. 1 into a quantized spectrum 311 (corresponding to transmitted spectrum 111), a code index 312 (corresponding to transmitted code index 112), a pitch lag 313 (corresponding to transmitted pitch lag 113) and to quantized-gain information 314 (corresponding to transmitted quantized gains 114). The reconstructed speech is outputted from a synthesis filter 303. This synthesis filter 303 is excited by the sum of two components, namely (a) a codevector from an innovation codebook 304 in response to the code index information 312 and the code gain extracted from the quantized gain information 314 by a gain codebook 307, and (b) a past-excitation component v from a past-excitation-codebook 305 in response to the received pitch-lag information 313 and the pitch gain retrieved by the gain codebook 307 from the quantized-gain information 314. The spectrum 311 is also used to drive the synthesis filter 303. More specifically, a periodic excitation signal is applied to the synthesis filter 303 to produce the desired output speech, this periodic excitation signal being constructed by adding the received innovation signal to a past-excitation-signal component, more precisely to the excitation signal a pitch-lag ago multiplied by the pitch gain. Whenever the

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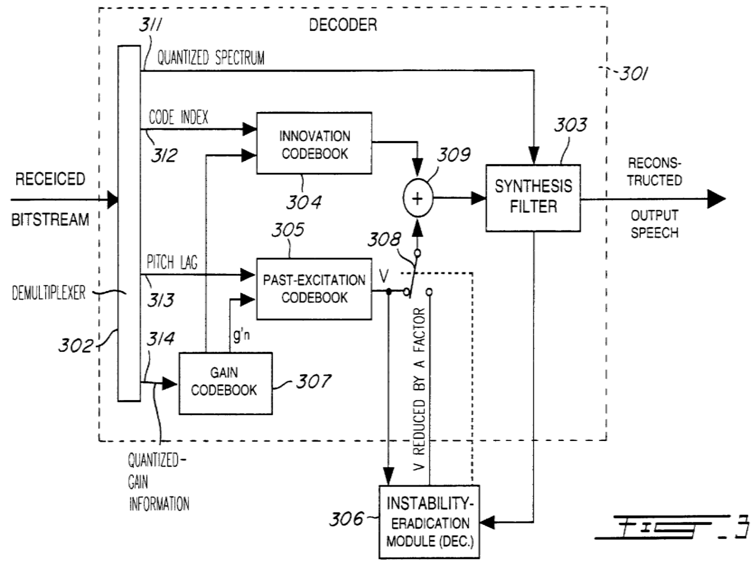
	frame duration is longer than the pitch lag, the frame is filled by repeating the past excitation according to the well known adaptive codebook technique. **‘060 Patent, 6:58-7:17.**  **’060 Patent, Fig. 3.**
[7e] the processing circuit applying gain reduction to the first contribution from the adaptive codebook then regenerating the second contribution from the fixed codebook.	To the extent this limitation is satisfied by the functionality accused in Plaintiff’s 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, the ‘060 patent discloses a processing circuit (*e.g.*, Speech Encoder/Decoder of Figures 1-3) that, under certain conditions, applies “gain reduction” to the “first contribution” from the adaptive (past-excitation) codebook by limiting the adaptive codebook gain g to the threshold value G_T. *See e.g.*, Steps 209-210 of Fig. 2. The ‘060 patent further discloses that the adaptive codebook gain g and the fixed codebook gain x are jointly quantized (in some embodiments) by using a vector quantization technique. *See e.g.*, Step 211 of Fig. 2. In such situations, the vector quantized value of the fixed codebook gain x, which is used for generating the “second contribution” from the fixed codebook, will be based in part on the value of the adaptive codebook gain g. Thus, after applying the threshold value G_T to the adaptive codebook gain g, the Speech Encoder/Decoder “regenerates” the fixed codebook contribution by identifying the

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	vector quantized value of the fixed codebook gain x, which is based in part on the threshold limited value of g (*i.e.*, where g = G_T). For example, without limitation, the '060 patent discloses: According to the invention, the instability eradication method comprises a detection step for detecting a set of conditions related to the spectral parameters and the pitch gain, and a modification step for reducing the pitch gain to a value lower than a given threshold whenever the conditions of the above mentioned set are detected in order to eradicate the occasional instability. **'060 Patent, 2:18-24.** The modification step may comprise the step of reducing a quantized version of the pitch gain to a value lower than a given threshold G_T whenever the conditions of the above mentioned set are detected in order to eradicate the occasional instability. **'060 Patent, 2:44-48.** Switch 110 is normally in the position as shown in FIG. 1. In this case, the instability-eradication module 105 does not interfere with normal operation of the encoder 101; indeed the pitch gain g outputted from module 103 is passed untouched to the quantization module 104. If however, the instability-eradication module 105 identifies a problem potential, it will change the position of switch 110 thereby saturating the current pitch gain g to some value (e.g.: G_T) and will cause the quantized pitch gain included in the output of gain vector-quantization module 104 to be limited to a value lower than a given threshold (e.g.: G_T). **'060 Patent, 7:50-60.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. A frame with problem potential is identified whenever the three following conditions are detected:

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Claims	Invalidity Based on US 5,893,060
	1) A resonance condition prevails in the input signal to be encoded. In other words a highly correlated stationary signal is present. A typical signal having these characteristics is a sinusoidal tone or a combination of tones. The present specification discloses an efficient approach to assessing resonance conditions by monitoring the occurrence of resonance in the LSP-spectrum already available in the encoder. 2) A duration condition is detected when the resonance condition has prevailed for at least the M most recent frames where M is an integer greater than 1; a typical value for M is 12. 3) A gain condition which evidences consistently-high values of the pitch gain in the N most recent frames, N being an integer greater than 1. For example, a consistently-high pitch-gain condition is detected when the average pitch gain computed over the most recent N+1 pitch-gain values exceeds a given threshold; a typical value for N is 7. **'060 Patent, 8:30-60.** Gain condition Step 209 detects a problem potential by detecting the consistently-high pitch-gain condition when the average G of the pitch gain over the N most recent frames, computed in step 208, is higher than a fixed threshold G_T, where 0.95 is a typical value for G_T according to the implementation illustrated in step 208. **'060 Patent, 9:49-55.** If a problem potential is detected Step 210 saturates the pitch gain g to G_T or another threshold (a simpler variant for step 210 consists of setting g = G_T because g is expected to be large on entering this step). The quantization operation of step 211 takes place in vector-quantization module 104 under instructions from the instability-eradication module 105 to limit the search range to codevectors corresponding to quantized pitch gains lower than G_T or similar value. **'060 Patent, 9:62-10:3.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given

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	value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. **'060 Patent, 8:30-39.** In essence, steps 201 through 204 determine whether or not a resonance condition prevails in the input speech signal to be encoded. If a resonance condition is detected, steps 206 and 207 determine whether the duration, during which the resonance condition has been prevailing, exceeds a given number of frames (duration condition). If this duration condition is detected, a problem potential is recognized if the (weighted) average pitch gain is above a given threshold and the current pitch gain is above a certain threshold G_T. When a problem potential is recognized, the quantized pitch gain g'_n is caused to stay below a certain threshold (e.g.: G_T) in step 211 by limiting the search range of the vector quantization module 104 (FIG. 1). **'060 Patent, 9:1-14.**

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	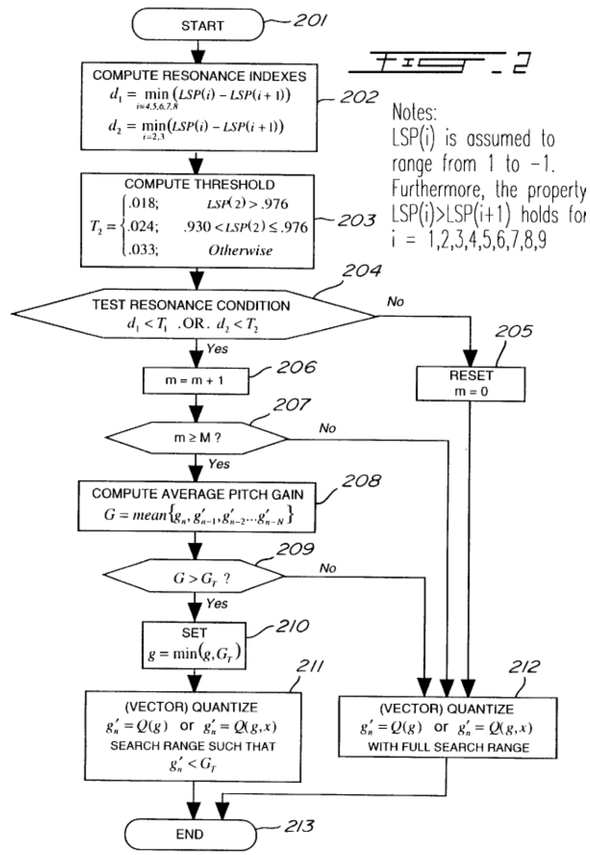 **'060 Patent, Fig. 2.**

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	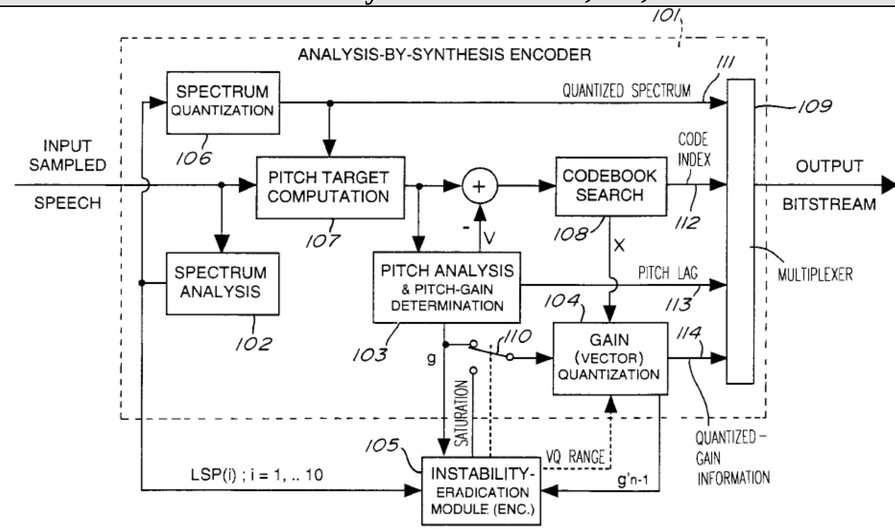 **'060 Patent, Fig. 1.**

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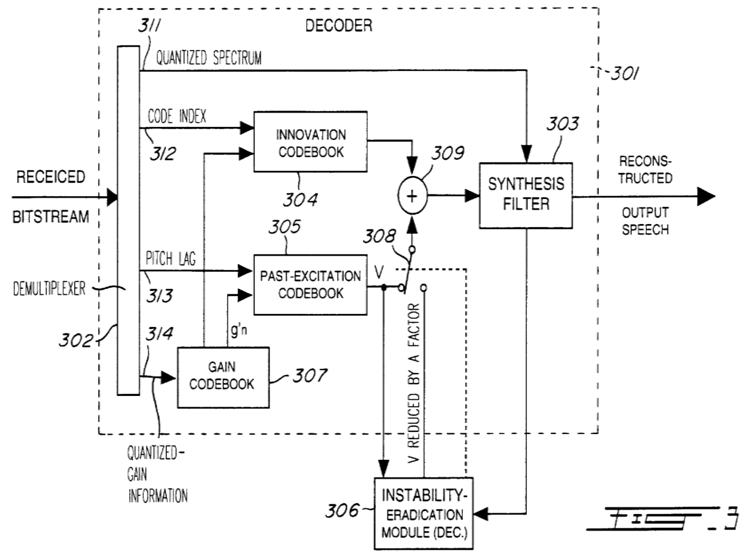
Claims	Invalidity Based on US 5,893,060
	 **'060 Patent, Fig. 3.**
8. The speech system of claim 7 wherein the gain reduction comprises application of a gain factor.	To the extent this limitation is satisfied by the functionality accused in Plaintiff's 11/23/09 infringement contentions, this limitation is disclosed in the prior art. For example, without limitation, the '060 patent discloses: According to the invention, the instability eradication method comprises a detection step for detecting a set of conditions related to the spectral parameters and the pitch gain, and a modification step for reducing the pitch gain to a value lower than a given threshold whenever the conditions of the above mentioned set are detected in order to eradicate the occasional instability. **'060 Patent, 2:18-24.** The modification step may comprise the step of reducing a quantized version of the pitch gain to a value lower than a given threshold G.sub.T whenever the conditions of the above mentioned set are detected in order to

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Claims	Invalidity Based on US 5,893,060
	eradicate the occasional instability. **'060 Patent, 2:44-48.** Switch 110 is normally in the position as shown in FIG. 1. In this case, the instability-eradication module 105 does not interfere with normal operation of the encoder 101; indeed the pitch gain g outputted from module 103 is passed untouched to the quantization module 104. If however, the instability-eradication module 105 identifies a problem potential, it will change the position of switch 110 thereby saturating the current pitch gain g to some value (e.g.: G.sub.T) and will cause the quantized pitch gain included in the output of gain vector-quantization module 104 to be limited to a value lower than a given threshold (e.g.: G.sub.T). **'060 Patent, 7:50-60.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. A frame with problem potential is identified whenever the three following conditions are detected: 1) A resonance condition prevails in the input signal to be encoded. In other words a highly correlated stationary signal is present. A typical signal having these characteristics is a sinusoidal tone or a combination of tones. The present specification discloses an efficient approach to assessing resonance conditions by monitoring the occurrence of resonance in the LSP-spectrum already available in the encoder. 2) A duration condition is detected when the resonance condition has prevailed for at least the M most recent frames where M is an integer greater than 1; a typical value for M is 12. 3) A gain condition which evidences consistently-high values of the pitch gain in the N most recent frames, N being an integer greater than 1. For example, a consistently-high pitch-gain condition is detected when the average pitch gain computed over the most recent N+1 pitch-gain values exceeds a given threshold; a typical value for N is 7.

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	'060 Patent, 8:30-60. Gain condition Step 209 detects a problem potential by detecting the consistently-high pitch-gain condition when the average G of the pitch gain over the N most recent frames, computed in step 208, is higher than a fixed threshold G_T, where 0.95 is a typical value for G_T according to the implementation illustrated in step 208. **'060 Patent, 9:49-55.** If a problem potential is detected Step 210 saturates the pitch gain g to G_T or another threshold (a simpler variant for step 210 consists of setting g = G_T because g is expected to be large on entering this step). The quantization operation of step 211 takes place in vector-quantization module 104 under instructions from the instability-eradication module 105 to limit the search range to codevectors corresponding to quantized pitch gains lower than G_T or similar value. **'060 Patent, 9:62-10:3.** The instability-eradication module 105 is used in conjunction with the encoder 101. Its purpose is to identify frames with problem potential and, whenever such frames occur, to saturate the current pitch gain g to a given value and to cause the quantized version of the pitch gain to assume a value lower than unity in the vector quantization process. This result is best obtained by limiting the vector-quantizer search range to those entries for which the corresponding quantized pitch gain assumes indeed the above mentioned value lower than unity. **'060 Patent, 8:30-39.** In essence, steps 201 through 204 determine whether or not a resonance condition prevails in the input speech signal to be encoded. If a resonance condition is detected, steps 206 and 207 determine whether the duration, during which the resonance condition has been prevailing, exceeds a given number of frames (duration condition). If this duration condition is detected, a problem potential is recognized if the (weighted) average pitch gain is above a given threshold and the current pitch gain is above a certain threshold G_T. When a problem potential is recognized, the quantized pitch gain g'_n is caused to stay below a certain threshold (e.g.: G_T) in step 211 by limiting the search range of the vector quantization module 104 (FIG. 1).

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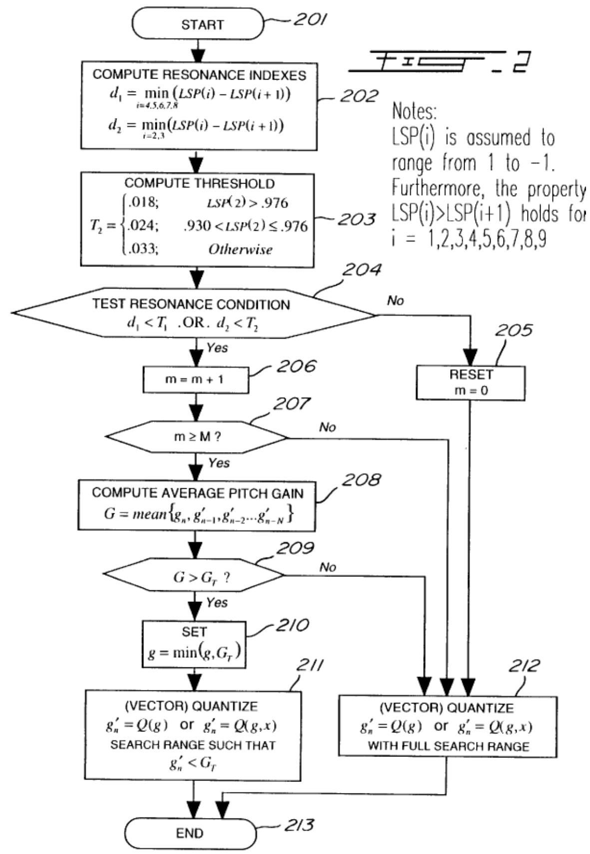
	’060 Patent, 9:1-14.



’060 Patent, Fig. 2.

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	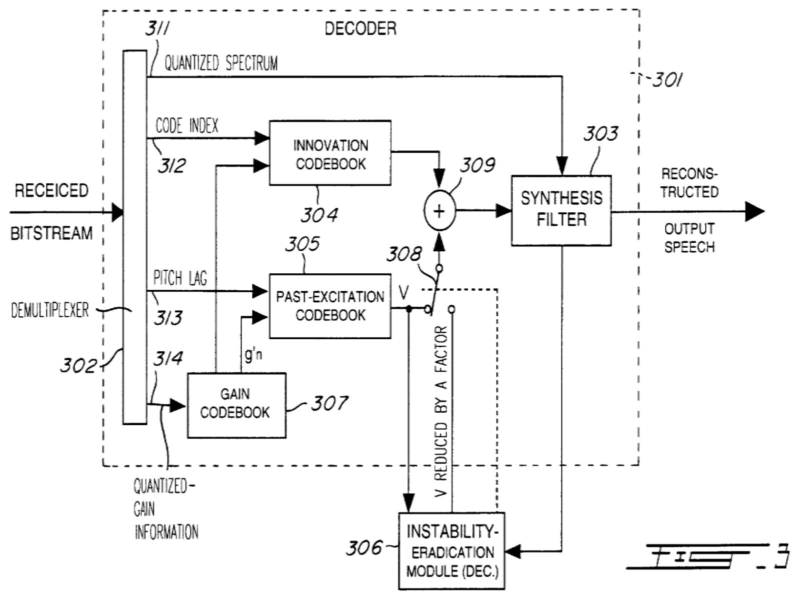 **'060 Patent, Fig. 3.**
9. The speech system of claim 8 wherein the processing circuit identifies the gain factor by considering an encoding bit rate.	